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Remarks

This response is being submitted within one month after the shortened statutory period set for responding to the office action mailed on August 13, 2003. Therefore, a petition and fee for an extension of time are filed with this response.

Hereinafter, the claims that are pending prior to the entry of the amendment in this response are called "currently pending" claims. This response amends currently pending claims 1, 2, 4, 6, and 8-12. Please add new claims 13-26. Upon amendment, the above-identified US patent application will have 3 independent claims (currently amended claims 1 and 10, and new claim 18) and 26 total claims (currently pending claims 3, 5, and 7, amended claims 1, 2, 4, 6, 8-12, and new claims 13-26).

The Applicants previously paid for up to 3 independent claims and 20 total claims. Therefore, a fee is due for additional excess claims and a check is enclosed herewith.

I. Support for amended and new claims

A. Support for amending currently pending claims 1, 2, 4, 6, and 8-12 and for new claims 13-26 can be found in, inter alia:

Amended claim 1:	Original claim 1,
Amended claim 2:	Original claim 2,
Amended claim 4:	Original claim 4,
Amended claim 6:	Original claim 6,
Amended claim 8:	Original claim 8,
Amended claim 9:	Original claim 9,
Amended claim 10:	Original claims 1 and 10,
Amended claim 11:	Original claims 11 and 12,

Amended claim 11:	Original claims 12,
New claim 13:	Original claim 1,
New claim 14:	Original claim 1,
New claim 15:	Original claim 1,
New claim 16:	Original claim 1,
New claim 17:	Original claim 1,
New claim 18:	Original claim 1,
New claim 19:	Original claim 1,
New claim 20:	Original claim 1,
New claim 21:	Original claim 4,
New claim 22:	Original claim 4,
New claim 23:	Original claim 4, and
New claim 24:	Original claim 9,
New claim 25:	Examples on pages 31-33,
New claim 26:	Examples on pages 33-34.

B. New Claims 18 and 21 recite: olefin polymerization catalyst component comprising an organometallic compound of general formula (I) in claim 18, and formula (II) in claim 21. Applicants respectfully submit that organometallic compound of general formula (I) in claim 18, and formula (II) in claim 21 are supported by the original specification because [D]_p as recited by original claims 1 and 4 represents a neutral Lewis base and is not part of the organometallic compound.

II. Claim Rejections – 35 U.S.C. § 112, second paragraph

A. The Examiner rejected currently pending claims 1-7, 9 and 10 under 35 U.S.C. § 112, second paragraph in item 6 of the official action. The Examiner rejects the mentioned claims because currently pending claims 1, 2, and 4, include broad language which is followed by “such as”, “preferably”, or “most preferably” and then followed by narrow language. Applicants respectfully submit that currently

pending claims 1, 2, and 4 were amended to meet the Examiner's rejection. The rejection should therefore be withdrawn.

B. The Examiner rejected currently pending claims 1-3, 5-7, 9 and 10 under 35 U.S.C. § 112, second paragraph in item 7 of the official action. The Examiner rejects the mentioned claims because currently pending claims 1, 9 and 10 recite the expression "isolobal". The Examiner asserts that the meaning of the word "isolobal" is not clear.

Applicants respectfully submit that "two molecular fragments are isolobal if the number, symmetry properties, approximate energy and shape of the frontier orbitals and the numbers of electrons in them are similar". Applicants respectfully make a reference to the text book: "Principles and Applications of Organotransition Metal Chemistry", (J. Collman, L. S. Hegedus, J. R. Norton, F. Finke, University Science Books Mill Valley, California) and submit copies of the cover page and pages 51-54 containing chapter 2.4 "Isoelectronic and Isolobal Analogies". The Explanation of the term "Isolobal" can be found on page 51 second paragraph from the bottom of the page. Applicants submit that the term "Isolobal" is well known and the rejection of claims 1-3, 5-7, 9 and 10 because of the word "Isolobal" not being clear be withdrawn. New claims 18 and 24 should not be rejected because of reciting the term "Isolobal".

C. The Examiner rejected currently pending claim 10 under 35 U.S.C. § 112, second paragraph in item 8 of the official action because the claim was written in plural form. The currently pending claim 10 was amended to be written in singular form. Applicants submit that the rejection of claim 10 should be withdrawn.

Claims 1-7, 9, 10 and 13-26 are readable upon the elected invention. Nonelected claims 8, 11, and 12 should be considered on the merits because these claims are each directly or indirectly dependent on an allowable base claim (e.g., currently amended claim 1).

Accordingly, reconsideration and examination of the present application is respectfully requested.

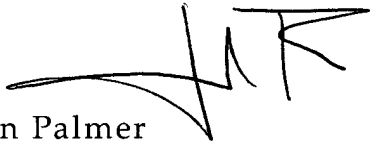
The application is now in condition for allowance. Allowance of the application at an early date is respectfully requested.

Applicants reserve the right to seek protection for any unclaimed subject matter, either subsequently in the prosecution of the present case or in a divisional or continuation application.

This response amends currently pending claims 1, 2, 4, 6, and 8-12 and adds new claims 13-26. The amendments and additions that are described in the preceding sentence were done to more fully claim the invention and were not done to overcome rejections under 35 U.S.C. 112, to overcome the prior art, or to overcome any other rejections or objections. The amendments and additions that are described in the first sentence of this paragraph shall not be considered necessary to overcome rejections under 35 U.S.C. 112, shall not be considered necessary to overcome the prior art, and shall not be considered necessary to overcome any other rejections or objections.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, then the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136 (a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

Respectfully submitted,



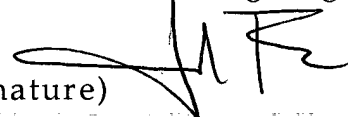
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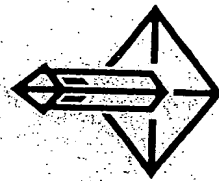
Principles and Applications of Organotransition Metal Chemistry

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Molecular orbital diagrams for all four of the general classes of "apparent exceptions to the 18-electron rule" show the same feature: a ligand orbital (or orbitals) becomes nonbonding because there are no metal orbitals of appropriate symmetry for it to interact with. This ligand-based nonbonding orbital allows the complex to accommodate more than 18 valence electrons without populating antibonding orbitals. Thus all four classes of "apparent exceptions" actually obey the spirit of the 18-electron rule: all of their bonding and nonbonding molecular orbitals are filled and all of their antibonding molecular orbitals are empty.

It is worth asking when such "apparent exceptions" can be expected. Although a complete analysis requires group-theoretical arguments beyond the scope of this book, a molecule must have many symmetry elements in order for any combination of ligand orbitals to differ in symmetry properties from all nine metal orbitals.

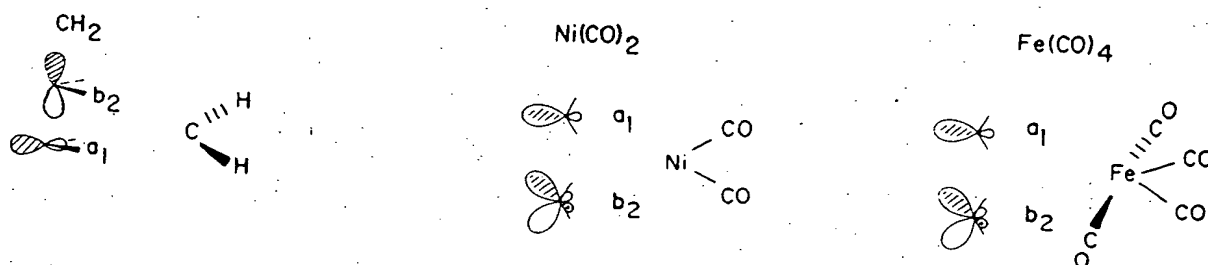
2.4 Isoelectronic and Isolobal Analogies

As in any branch of chemistry, it is useful in organometallic chemistry to draw analogies between different compounds. One term which is frequently used to do this is "isoelectronic," which means "having the same structure and the same number of valence electrons, but differing by exchange of one or two nuclei with those of adjacent elements in the periodic table." For example, we speak of $[\text{V}(\text{CO})_6]^-$, $\text{Cr}(\text{CO})_6$, and $[\text{Mn}(\text{CO})_6]^+$ as an "isoelectronic series"; note that the overall charge changes as we substitute different metal nuclei. We also speak of $\text{Ni}(\text{CO})_4$, $\text{Co}(\text{NO})(\text{CO})_3$, and $\text{Fe}(\text{NO})_2(\text{CO})_2$ as an isoelectronic series; here the replacement of C by N as we exchange metals results in a constant overall charge. Many chemists also call $\text{CpMn}(\text{CO})_3$ and $[\text{CpRu}(\text{CO})_3]^+$ "isoelectronic" despite the fact that the metals involved belong to different rows of the periodic table.

Ronald Hoffmann [9,30] has recently introduced the term "isolobal" for comparing molecular fragments with each other and with familiar species from organic chemistry. He defines two fragments as isolobal if "the number, symmetry properties, approximate energy and shape of the frontier orbitals and the number of electrons in them are similar — not identical, but similar." (The frontier orbitals are the higher occupied and lower unoccupied molecular orbitals.)

As shown in Figure 2.21, the frontier orbitals of $\text{Fe}(\text{CO})_4$ and $\text{Ni}(\text{CO})_2$ are similar to each other and to those of methylene, CH_2 . All have one frontier orbital of a_1 symmetry and one of b_2 symmetry. Thus, despite the fact that the energy ordering is reversed between the methylene fragment (where the a_1 orbital is lower in energy) and the metal fragments (where the b_2 orbital is lower in energy), all three fragments are isolobal.

Figure 2.21



Two electrons occupy the frontier orbitals
in each fragment

Similar examination of their frontier orbitals (which consist of a single a_1 orbital with a single electron) shows that $\text{Mn}(\text{CO})_5$ is isolobal with CH_3 . Upon removal of an electron from both species it is clear that $[\text{Mn}(\text{CO})_5]^+$ is isolobal with CH_3^+ , and upon addition of an electron to both species it is clear that $[\text{Mn}(\text{CO})_5]^-$ is isolobal with CH_3^- . As species which are isoelectronic (i.e., $[\text{Mn}(\text{CO})_5]^+$ and $\text{Cr}(\text{CO})_5$, $[\text{Mn}(\text{CO})_5]^-$ and $\text{Fe}(\text{CO})_5$) are necessarily also isolobal, $\text{Cr}(\text{CO})_5$ is isolobal with CH_3^+ , and $\text{Fe}(\text{CO})_5$ is isolobal with CH_3^- .

Examination of the frontier orbitals of Cp^- (the η^5 -cyclopentadienyl ligand) shows that it is isolobal with three mutually cis carbonyl ligands, so $\text{Mn}(\text{CO})_5$ is isolobal with $[\text{CpMn}(\text{CO})_2]^-$ and therefore with the isoelectronic $\text{CpFe}(\text{CO})_2$ fragment. By similar reasoning $[\text{CpFe}(\text{CO})]^-$ and $\text{CpCo}(\text{CO})$ are isolobal with the $\text{Fe}(\text{CO})_4$ fragment, and $\text{CpCr}(\text{CO})_2$ is isolobal with $[\text{Cr}(\text{CO})_5]^+$ and with CH_3^{2+} .

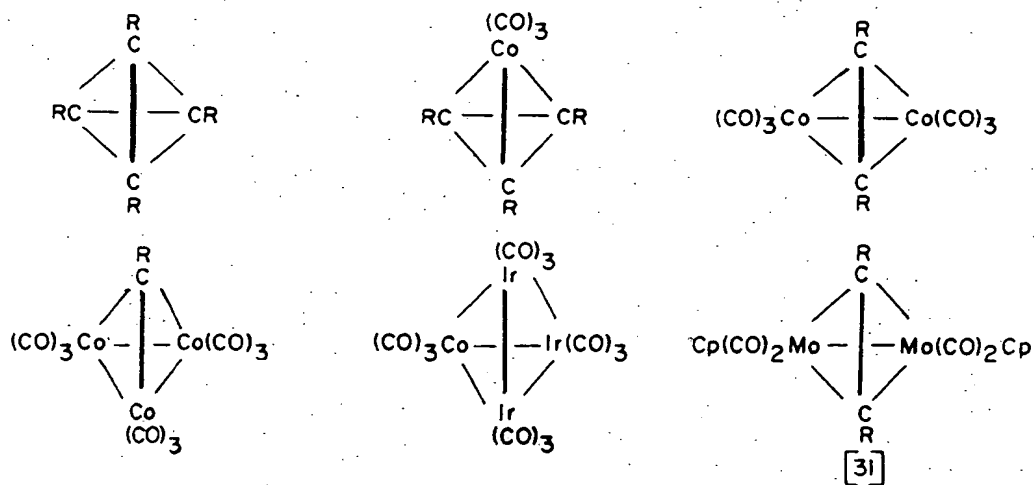
Two final isolobal series relate $\text{Co}(\text{CO})_3$ and CpNi to methyldyne, CH , and $\text{Fe}(\text{CO})_3$ and CpCo to CH^+ . Table 2.4 summarizes the metal complex fragments which are isolobal with each of the five fundamentally different one-carbon hydrocarbon fragments: CH_4 , CH_3 , CH_2 , CH , and C . The table lists only common cyclopentadienyl- and carbonyl-containing fragments of the first-row elements, but its extension to the second and third transition series is obvious. Note that the addition or subtraction of a proton from the one-carbon hydrocarbon fragments does not change the number of electrons in frontier orbitals and makes no important change in their symmetry properties, and thus produces a hydrocarbon fragment isolobal with the original one.

Table 2.4. Isolobal Relationships Among Organic and Inorganic Fragments.

Neutral hydrocarbon fragment	CH ₄	CH ₃	CH ₂	CH	C
Charged hydrocarbon fragments related by $\pm H^+$	CH ₃ ⁻	CH ₂ ⁻	CH ⁻ CH ₃ ⁺	CH ₂ ⁺	CH ⁺
Common isolobal inorganic fragments containing metals of the first transition series	Cr(CO) ₆ Fe(CO) ₅ Ni(CO) ₄	Mn(CO) ₅ CpFe(CO) ₂ Co(CO) ₄	Cr(CO) ₅ Fe(CO) ₄ CpCo(CO) Ni(CO) ₃ CpCu Ni(CO) ₂	CpCr(CO) ₂ Mn(CO) ₄ CpFe(CO) Co(CO) ₃ CpNi	Cr(CO) ₄ CpMn(CO) Fe(CO) ₃ CpCo

Many organometallic complexes are related to each other and to organic molecules by isolobal substitution, and the isolobal analogy has inspired many successful syntheses of new organometallics. All the corners of each tetrahedron in Figure 2.22 are related

Figure 2.22



by isolobal substitution to methylidyne, CH; the corners of each triangle in Figure 2.23 are isolobal with either the methylene (CH_2) or the methylidyne (CH) of cyclopropene; all the corners of each triangle in Figure 2.24 are isolobal with methylene, CH_2 . (Olefin and acetylene complexes are drawn with metallacyclopropane and metallacyclopentadiene resonance structures in order to make the isolobal analogies more apparent.) The various combinations of $\text{CpRh}(\text{CO})$, $\text{Fe}(\text{CO})_4$, $\text{Os}(\text{CO})_4$, and CH_2 fragments illustrated in Figure 2.24 suggest that it should be possible to construct many organometallic analogs of cycloalkanes [34].

Figure 2.23

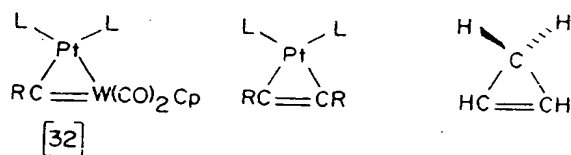


Figure 2.24

